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IN THE UNITED STATES DISTRICT COURT FOR THE DISTRICT OF MONTANA - BUTTE DIVISION

COTTONWOOD ENVIRONMENTAL LAW CENTER; MONTANA RIVERS; and GALLATIN WILDLIFE ASSOCIATION, *Plaintiffs,* vs. RON EDWARDS, in his official capacity as Manager of the Big Sky Water and Sewer District; and BIG SKY WATER AND SEWER DISTRICT, *Defendants.*	Case No. 2:20-cv-00028-BMM EXHIBIT 11

Resort Area Wastewater Analysis

Big Sky, MT

September 28, 2015

Prepared for:
MB MT Acquisition LLC

Prepared by:
WGM Group, Inc.

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Appendices

I. EXECUTIVE SUMMARY

WGM Group, Inc. was retained by MB MT Acquisition LLC to provide analysis and summary of current wastewater flows, as well as projected 20-year wastewater flows for Moonlight Basin Resort, Spanish Peaks Resort, Yellowstone Club, and Big Sky Resort, based on the Overall Development Plan (ODP). Reclamation and reuse options for wastewater were also reviewed to understand requirements for approval of such uses.

As Moonlight Basin, Spanish Peaks, Yellowstone Club, and Big Sky Resort were planned and designed independent of one another by different developers and consultants, the facility descriptions and methods used for estimating wastewater generation are not consistent between the developments. Now with common ownership, estimating wastewater generation in a consistent manner for all developments will allow for direct comparison of treatment and disposal needs, simplify the analysis of alternatives, and offer an easy way to evaluate combined flows across the developments.

WGM Group reviewed engineering reports supplied for Moonlight Basin, Spanish Peaks, and Yellowstone Club, as well as documents and data provided by the Big Sky County Water and Sewer District (BSCWSD). From these documents, we gleaned information on past wastewater flow projections, current flows, current treatment capacity, and DEQ approvals. In addition, WGM reviewed the August 2015 BSCWSD Master Plan Update, prepared by DOWL.

As the project progressed, efforts shifted away from Big Sky Resort to focus on Moonlight Basin, Spanish Peaks, and Yellowstone Club. Preliminary wastewater generation numbers for Big Sky Resort were determined early in the process, but Big Sky Resort was ultimately excluded from final analysis and modeling. Preliminary Big Sky Resort numbers are included in this report for general comparison only.

To project future wastewater flows, WGM Group work with representatives from each resort to develop a wastewater generation model. The model provides wastewater generation projections for a 20-year horizon, based on anticipated development rates and occupancy rates. In addition, the model depicts the current flow and limits of treatment and disposal. Wastewater generation is estimated at 86 gpcpd, based on historic area wastewater flows, as determined in the BSCWSD Master Plan Update.

Current and future occupancy rates were established for Moonlight Basin, Spanish Peaks and Yellowstone Club based our review of available current occupancy rates and occupancy rates of established comparable resorts. Occupancy rates vary significantly by season, however it is anticipated that occupancy rates will increase in the non-winter months as the resort move towards year around attraction.

Based on our analysis and wastewater generation model, we computed the full build-out average day and annual flows for each of the three developments, which are shown in Table 1.

Table 1: Full Build-Out Wastewater Generation Estimates from WGM Group Model

	Total Development Average Daily Flow (gpd)	Total Development Annual Volume (MGY)
Moonlight Basin	310,558	113.4
Spanish Peaks	177,723	64.9
Yellowstone Club	64,020	23.4
Big Sky Resort*	192,701	70.3

*Big Sky Resort numbers are from a preliminary analysis and are included to provide a relative comparison but are not calculated using the updated method.

In general, the wastewater generation volumes from the updated model are lower than volumes that were previously determined for each resort, with reductions of 13% for Moonlight Basin, 18% for Spanish Peaks and 71% for Yellowstone Club. The reductions are the result of including occupancy rates in the model, rather than typical wastewater generation volumes based on number or units.

The results of the 20-year wastewater model are presented graphically showing limits of current treatment and disposal for Moonlight Basin, Spanish Peaks and Yellowstone Club. These graphs are shown in Section III F.

Available effluent disposal through golf course irrigation is reviewed with the wastewater generation volumes from the new model. Several graphs were prepared that indicate combinations of area wastewater generation and possible disposal locations. In general, the existing golf courses do not require enough irrigation to dispose of the wastewater anticipated with the full development of the resorts. These graphs are shown in Section IIIG.

Attention is drawn to Section III I that provides a summary of important information and thoughts from the wastewater analysis.

Recently updated DEQ regulations include new standards for water reclamation and reuse. Standards are now provided for wastewater disposal through rapid infiltration to groundwater and snow making. Either of these options would be beneficial to the Big Sky area because they would allow disposal during winter months and greatly reduce the amount of effluent storage and area that is needed for land application.

II. INTRODUCTION

WGM Group, Inc. was retained by MB MT Acquisition LLC to provide analysis and summary of current wastewater flows, as well as projected 20-year wastewater flows for Moonlight Basin Resort, Spanish Peaks Resort, Yellowstone Club, and Big Sky Resort, based on the Overall Development Plan (ODP). Tasks included obtaining development ODPs and previous wastewater generation estimates; providing current wastewater generation estimates and 20-year projections; identifying general areas for storage and discharge, irrigation/land application needs, and collection basins; and preparing a summary report.

As the project progressed, efforts shifted away from Big Sky Resort to focus on Moonlight Basin, Spanish Peaks, and Yellowstone Club. Preliminary wastewater generation numbers for Big Sky Resort were determined early in the process, but Big Sky Resort was ultimately excluded from final analysis and modeling. Preliminary Big Sky Resort numbers are included in this report for general comparison only.

III. WASTEWATER GENERATION PROJECTIONS

The amount of wastewater generated depends on the type, size, and quantity of various facilities and the area population. Average flow estimates for various land uses can be obtained from a number of sources, including local or state regulations, federal guidelines, professional publications, and measurements from existing facilities. The average flow can vary depending on how a facility is defined and the source of estimated flows for each use. As a result, projected wastewater flows can vary between similar developments. As Moonlight Basin, Spanish Peaks, Yellowstone Club, and Big Sky Resort were planned and designed independent of one another by different developers and consultants, the facility descriptions and methods used for projecting future wastewater flows is not consistent between the developments.

With a common ownership interest between the four developments, it will be beneficial to calculate wastewater flows in a consistent manner. To establish a common method of estimating flows, we reviewed relevant Montana Department of Environmental Quality (DEQ) regulations, past methods utilized for estimating flows for each development, the method utilized by the Big Sky County Water and Sewer District (BSCWSD), current measured flows for each development, current levels of development, and anticipated occupancy rates for each development.

A. DEQ Regulations

Wastewater collection systems, pumping stations, and treatment and disposal facilities must meet the requirements of Circular DEQ-2, *Design Standards for Public Sewage Systems*. The following flows must be identified for the design year and used as a basis for the design of wastewater facilities.

- **Design Average Flow** – the average daily volume to be received for a continuous 12-month period, expressed as a volume per unit time. For facilities having a critical seasonal high hydraulic loading period, the average flow must be based on the average flow during the seasonal period.
- **Design Maximum Day Flow** – the largest volume of flow to be received during a continuous 24-hour period, expressed as a volume per unit time.
- **Design Peak Hour Flow** – the largest volume of flow to be received during a one-hour period, expressed as a volume per unit time.
- **Design Peak Instantaneous Flow** – the instantaneous maximum flow rate to be received, expressed as a volume per unit time.
- **Design Maximum Month Flow** – the average daily flow received during the maximum calendar month or 30 consecutive days (whichever is greater), expressed as a volume per unit time.

In areas of existing facilities, DEQ standards state that wastewater generation projections should to be based on existing flow data, taking into account seasonal variations in flow. The sizing of wastewater facilities receiving flows from new

wastewater collection systems must be based on an average daily flow of 100 gallons per capita plus wastewater flows from industrial plants and major institutional and commercial facilities.

For new facilities (without existing flows), the peak hour flow is to be based on the following peaking factor formula:

$$\text{Peaking Factor} = \frac{18+\sqrt{(P)}}{4+\sqrt{(P)}}$$

In addition to Circular DEQ-2, public sewer systems with subsurface treatment must meet the requirements of Circular DEQ-4, *Montana Standards for Subsurface Wastewater Treatment Systems.* While this circular typically applies to individual or community drainfields, it contains average flow values for various commercial facilities that are often used for wastewater flow generation calculations.

B. Data Review

WGM Group reviewed engineering reports supplied for Moonlight Basin, Spanish Peaks, and Yellowstone Club. In addition, we reviewed documents and data provided by the Big Sky County Water and Sewer District (BSCWSD), which provides sewer service for Big Sky Resort. From these documents, we were able to glean information on past wastewater flow projections, current flows, current treatment capacity, and DEQ approvals. A series of maps was created to graphically represent various aspects of our analysis. These maps are included in Appendix E.

1. Previous Wastewater Flow Projections

The wastewater flow estimates calculated previously for Moonlight Basin, Spanish Peaks, and Yellowstone Club were based on anticipated development plans that identified residential, commercial, and recreation land uses. However, the average wastewater flow rates used for projections varied between the developments, depending on the reference data, land use descriptions, and assumptions that were made. Table 2 summarizes the varying information used previously, including the total average daily flow estimated for each development. A more detailed overview of the method previously used for each development is included in Appendix A.

Table 2: Previous Wastewater Generation Numbers

	Assumed People per Residential Unit	Wastewater per Capita (gpd)	Total Average Daily Flow (gpd)
Moonlight Basin	2 - 6	100	357,640
Spanish Peaks	1 - 3.6	82	156,838
Yellowstone Club	2.1	100	220,685

2. Current Measured Wastewater Flows

Measured wastewater flows from 2013 were available for Moonlight Basin, Yellowstone Club, and the BSCWSD. Because Spanish Peaks and Big Sky Resort are connected to the BSCWSD, separate measured flows were not available for these two developments.

Table 3: Current Measured Wastewater Flows

Development	2013 Average Daily Flow (gpd)
Moonlight Basin	22,000
Yellowstone Club	16,285
BSCWSD	310,904

For all developments, seasonal high wastewater flows occur in the winter months – January, February, and March. Winter flows from the BSCWSD were reviewed from 2006-2013. This data was used to develop representative peaking factors for seasonal high wastewater flows. The BSCWSD data was chosen because it has been consistently collected over a wide range of years, offering an overall representation of developments in the area. Table 4 identifies the peaking factors that were determined based on the existing flow data included in Appendix B. The peaking factors were applied to the estimated average daily flows to determine values such as Design Average Flow, Design Maximum Day Flow, and Design Maximum Month Flow.

Table 4: Design Peaking Factors

Design Values for Seasonal Flow	Peaking Factor
Design Average Flow (Seasonal High)	1.27
Design Maximum Day Flow	1.79
Design Maximum Month Flow	1.33

3. Current Wastewater Treatment Capacities and DEQ Approvals

Since Moonlight Basin and Yellowstone Club each has an independent wastewater treatment facility, current treatment capacities and DEQ approvals were reviewed to determine current development limitations.

Moonlight Basin's wastewater treatment plant was approved by DEQ on May 19, 2003 under E.Q. #02-2107. The treatment plant is approved for a full build-out average daily flow of 100,000 gallons per day (gpd). 13,359,000 gallons of storage

are approved in three effluent storage ponds and 16.4 acres are approved for irrigation. At full build-out, DEQ requires the abandonment of the existing trickling filter and infiltration cells originally approved under E.Q. #99-2426.

Yellowstone Club's original wastewater trickling filter was approved by DEQ for a capacity of 74,580 gpd. A new SBR treatment plant was recently approved under E.Q. #14-1891. This SBR plant will replace the original treatment system and is approved for an initial capacity of 50,000 gpd. The plant can be expanded in 50,000-gpd phases to provide a total capacity of 200,000 gpd. A total of 101 million gallons per year (MGY) of treated effluent is approved to be applied to the Yellowstone Club golf course for irrigation.

4. **Big Sky County Water and Sewer District SFE Connection Method**
The BSCWSD method for estimating wastewater flows for new connections is outlined in Ordinance 97-1001. This ordinance was adopted in 1997 and has been updated several times. Estimated wastewater flows for new connections are determined based on the number of Single Family Equivalents (SFE) for each unit being connected to the system. SFEs are calculated based on the BSCWSD Single Family Equivalent Unit Conversion Schedule, which uses square footage for residential units and identifies various commercial uses.

5. **Big Sky County Water and Sewer District Facility Plan Update**
The BSCWSD is currently working with DOWL, an engineering consulting firm, to update their wastewater master plan. A DOWL report titled "Wastewater System Master Plan Update for Big Sky County Water and Sewer District 363" and dated August 2015 was provided for our review.

As part of the Master Plan update, DOWL conducted a review of historic wastewater flows, organic loading levels, and the number of SFEs within the district. Using the recorded organic loading levels at the BSCWSD wastewater treatment plant, an equivalent population within the district was determined for each month over the past several years. The equivalent population was then compared to the known number of SFEs to determine an average population per SFE. As anticipated, the equivalent population and the population per SFE vary, depending on the time of year. Population numbers are highest in the winter months, lowest in the spring and fall, and moderate in the summer. The population per SFE ranges from 0.3 to 1.5 people. These SFE numbers are lower than expected (as an example, the average population per unit for the town of Big Sky is 2.1 people per unit) because not all of the lodging units are used year-round. This varying range of people per SFE helps account for the varying occupancy rates within the district.

Using the equivalent populations and actual wastewater flows within the district, the average wastewater generated per capita within the district was determined

to be 86 gpcpd, which includes 11.9 gpcpd for inflow and infiltration into the system. It was also determined that the average flow per SFE within the district is currently 26,500 gpy/SFE or 72.6 gpd/SFE.

Table 5: BSCWSD Master Plan Update Wastewater Generation Rates

Average Daily Flow Per Person	86 gpcpd
Average Daily Flow Per SFE	72.6 gpd

In projecting future wastewater flows, the BSCWSD's update assumed occupancy rates would increase by 15 percent during the ski season and 20 percent during the remaining months. The District accounts for this increase in occupancy rate by increasing the number of people per SFE in in their full build-out calculation. Occupancy is discussed further in Section IIIC.

The DOWL report references the 2001 agreement between that BSCWSD and area developers that provides the District the right to dispose of 160 MGY and store 130 MG of treated effluent on the Yellowstone Club and Spanish Peaks land.

DOWL's report provides updated estimates for wastewater disposal using the available irrigation land application. Utilizing the updated amount of irrigation disposal, a water balance model is provided that indicates at full build-out, if the BSCWSD utilized the 130 MG of storage on the Yellowstone Club and Spanish Peaks land, there would still be a storage shortage of 8.1 MG. Table 6 provides the updated golf course irrigation capacities from the DOWL report. These capacities are compared with disposal capacities determined by Moonlight Basin, Spanish Peaks and Yellowstone Club in Section IIIG.

Table 6: BSCWSD Disposal Capacity Through Golf Course Irrigation
(from DOWL report)

Golf Course	Prior Calculated Capacity (MGY)	Updated Capacity (MGY)
Meadow Village	206*	140-160
Yellowstone Club	76**	22-28
Spanish Peaks	100.8**	20-30
Total	**382.8**	**182-218**

* Per DEQ approval
** Based on design reports

C. Estimated Occupancy Rates

Occupancy is a critical factor in predicting wastewater flows, and must be viewed in addition to development rates to get a complete picture. While the development rate indicates the rate at which units will be built (often referred to as growth rate), the occupancy rate demonstrates how much a unit is utilized at any particular time. We expect development rates to continue to increase throughout the development period, but occupancy rates are expected to reach a relatively constant level once each development has established its full complement of uses. New facilities or amenities may make a resort more desirable to visit and thus increase the occupancy rate, but occupancy rate typically does not increase with the addition of units alone.

Because the developments are generally recreational resorts, occupancy has a wide seasonal variation – highest in the winter, lowest in the spring and fall. As the developments become more established and focus on year-round recreational opportunities, occupancy rates will become more consistent throughout the year.

Current occupancy rates were estimated for each development based on data provided. Moonlight Basin's current (2015) occupancy was estimated from actual occupancy data provided for 2006/2007. Similarly, Yellowstone Club provided 2014/2015 occupancy information that was used to establish current values. As no actual data was provided for Spanish Peaks, occupancy was estimated to be similar but slightly lower than Moonlight Basin. Table 7 lists the 2015 average occupancy rates by month for each development.

Table 7: 2015 Estimated Occupancy Rates in Percent

	Moonlight Basin	Spanish Peaks	Yellowstone Club
January	48	39	22
February	48	39	27
March	48	39	24
April	2	5	9
May	2	2	1
June	7	5	4
July	7	15	15
August	7	10	17
September	5	10	10
October	2	5	2
November	30	10	5
December	48	35	28
Annual Average	**21%**	**18%**	**14%**

With current occupancy established, efforts were focused on estimating occupancy rates once each development has fully established its year-round uses. For all developments, this established occupancy rate is expected in approximately ten years, in 2025. We looked at comparable resorts to glean occupancy information for more established areas. Ten years of average occupancy data was obtained for Aspen and Vail in Colorado, Jackson Hole in Wyoming, and Park City in Utah. For our analysis, we used the four years of occupancy data between 2011 and 2014. Over this period, Aspen, Vail, and Jackson Hole had an annual average occupancy rate near 50%, while Park City was at 35%. In addition to reviewing comparable resort data, a 2008 report for Moonlight Basin was reviewed that provided anticipated occupancy rates at full build-out. Based on the 2008 Moonlight Basin report and rates from other resort areas, monthly average occupancy rates for 2025 were estimated for Moonlight Basin, Spanish Peaks, and Yellowstone Club. Data utilized for these estimates is included in Appendix D.

As with current occupancy rates, 2025 established occupancy for Moonlight Basin was the highest of the three developments. Spanish Peak rates were assumed to be slightly lower than Moonlight Basin, and Yellowstone Club was estimated to be much lower due to the private nature of the development. Table 8 lists the estimated, monthly 2025 occupancy rates for each of the developments.

Table 8: Estimated Established Occupancy Rates (2025) in Percent

	Moonlight Basin	Spanish Peaks	Yellowstone Club
January	70	65	30
February	70	65	30
March	70	65	25
April	30	30	10
May	20	15	5
June	50	30	10
July	65	35	20
August	60	50	20
September	45	40	10
October	35	30	5
November	30	20	5
December	60	60	30
Annual Average	**50%**	**42%**	**17%**

The DOWL BSCWSD Master Plan Update also included an assumption for increased occupancy rates in the area, assuming the rate within the District will increase by 15% during the ski season and 20% during the remainder of the year. To account for this

rate increase, DOWL increased the population per SFE for the full build-out calculations.

The DOWL report accounted for occupancy rates by using a lower number of SFE per units (ranges of 0.574 to 1.536 in 2015), while this report calculated wastewater based on typical people per unit with a reduction in flow based on the anticipated occupancy. The DOWL report did not explain how the 15% and 20% increases were established. These values are much lower than the overall occupancy rate increases that were established for Moonlight Basin, Spanish Peaks and Yellowstone Club, which in some cases indicate occupancy rate increases of over 100%.

D. Updated Wastewater Projections

Based on our review of previous wastewater estimates, current flows, and occupancy rates, a recommended method of estimating wastewater flows was developed that can be applied to Moonlight Basin, Spanish Peaks, and Yellowstone Club. This uniform method identifies wastewater projections for each development, but also provides an easy way to evaluate combined flows across the developments. Using this newly developed method, WGM Group created a wastewater generation model for use in projecting anticipated wastewater flows over the life of each development. The model starts with current wastewater flows and provides wastewater generation projections for a 20-year horizon, based on anticipated development rates and occupancy rates for each development.

Wastewater generation for each resort was estimated based on the type of units, assumed population per unit, wastewater flow per capita, and estimated occupancy rates. Based on an assumed square footage for each unit, a number of bedrooms per unit was assumed and a consistent method was used to estimate the number of people per unit. As Moonlight Basin, Spanish Peaks, and Yellowstone Club are similar, seasonal developments to that of the BSCWSD, the BSCWSD average wastewater flow of 86 gpcpd was deemed applicable for all developments. Applying this per capita rate to the specific population per unit determined for Moonlight Basin, Spanish Peaks, and Yellowstone Club yields a wastewater flow per unit that is specific to each development's lodging diversity. Finally, occupancy rates were applied to account for seasonal use variations. Model data in included in Appendix C.

As an additional point of comparison, the BSCWSD's method for determining Single Family Equivalents (SFEs) was applied to each resort. This allowed estimated annual flows in each development to be divided by the anticipated number of SFEs to arrive at an average flow per SFE. While the SFE values are not directly used in the wastewater model for Moonlight Basin, Spanish Peaks, and Yellowstone Club, they provide values that can be directly compared to the BSCWSD. Table 9 illustrates the full build-out average day and annual flows for each development, as obtained from our wastewater generation projection model.

Table 9: Full Build-Out Wastewater Projections from WGM Group Model

	Full Build-Out Average Daily Flow (gpd)	Full Build-Out Annual Volume (MGY)
Moonlight Basin	310,558	113.4
Spanish Peaks	177,723	64.9
Yellowstone Club	64,020	23.4
Big Sky Resort*	192,701	70.3

*Big Sky Resort numbers are from a preliminary analysis and are included to provide a relative comparison but are not calculated using the updated method.

Because the newly estimated projections take into account occupancy rates, these values are lower than those previously estimated for each development. Table 10 compares the new estimates to previous estimates. While the difference is relatively large, the updated numbers offer a more realistic projection.

Table 10: Updated Full Build-Out Wastewater Estimate vs Past Estimates

	Past Estimate Average Daily Flow (gpd)	Updated Estimate Average Daily Flow (gpd)	% Difference
Moonlight Basin	357,640	310,558	-13%
Spanish Peaks	216,973	177,723	-18%
Yellowstone Club	220,685	64,020	-71%
*Big Sky Resort	258,077	192,701	-25%

*Big Sky Resort numbers are from a preliminary analysis and are included to provide a relative comparison but are not calculated using the updated method.

Using the factors developed from historic BSCWSD flows, seasonal flows were estimated and are shown in Table 11. Seasonal high flows provide a complete picture of the wastewater values that are typically used in designing wastewater facilities.

Table 11: Updated Seasonal High Wastewater Generation Flows

NOTE: Big Sky Resort numbers are from a preliminary analysis and are included to provide a relative comparison but are not calculated using the updated method.

	Annual Average Daily Flow (gpd)	Design Average Daily Flow (gpd)	Max Day Flow (gpd)	Max Month Flow (gpd)
Moonlight Basin	310,558	394,408	555,890	413,042
Spanish Peaks	177,723	225,708	318,124	236,372
Yellowstone Club	64,020	81,305	114,596	85,147
Big Sky Resort*	192,701	244,730	334,935	256,292

E. Irrigation Disposal at Moonlight Basin, Spanish Peaks and Yellowstone Club

Land application of treated wastewater effluent is the only disposal means currently available in the Big Sky Area. Because of spring snow melt and relatively cool early fall months, actual irrigation needs for the golf courses have been found to be less than what has been approved by DEQ. In order to provide an accurate representation of the amount of treated effluent that can be applied to the Moonlight Basin, Spanish Peaks, and Yellowstone Club golf courses, actual irrigation numbers volumes were obtained from golf course personnel. These volumes are shown in Table 12. Disposal capacities on the Spanish Peaks and Yellowstone Club golf courses are substantially less than application rates that had been previously determined.

Table 12: Anticipated Effluent Volume for Application on Golf Courses

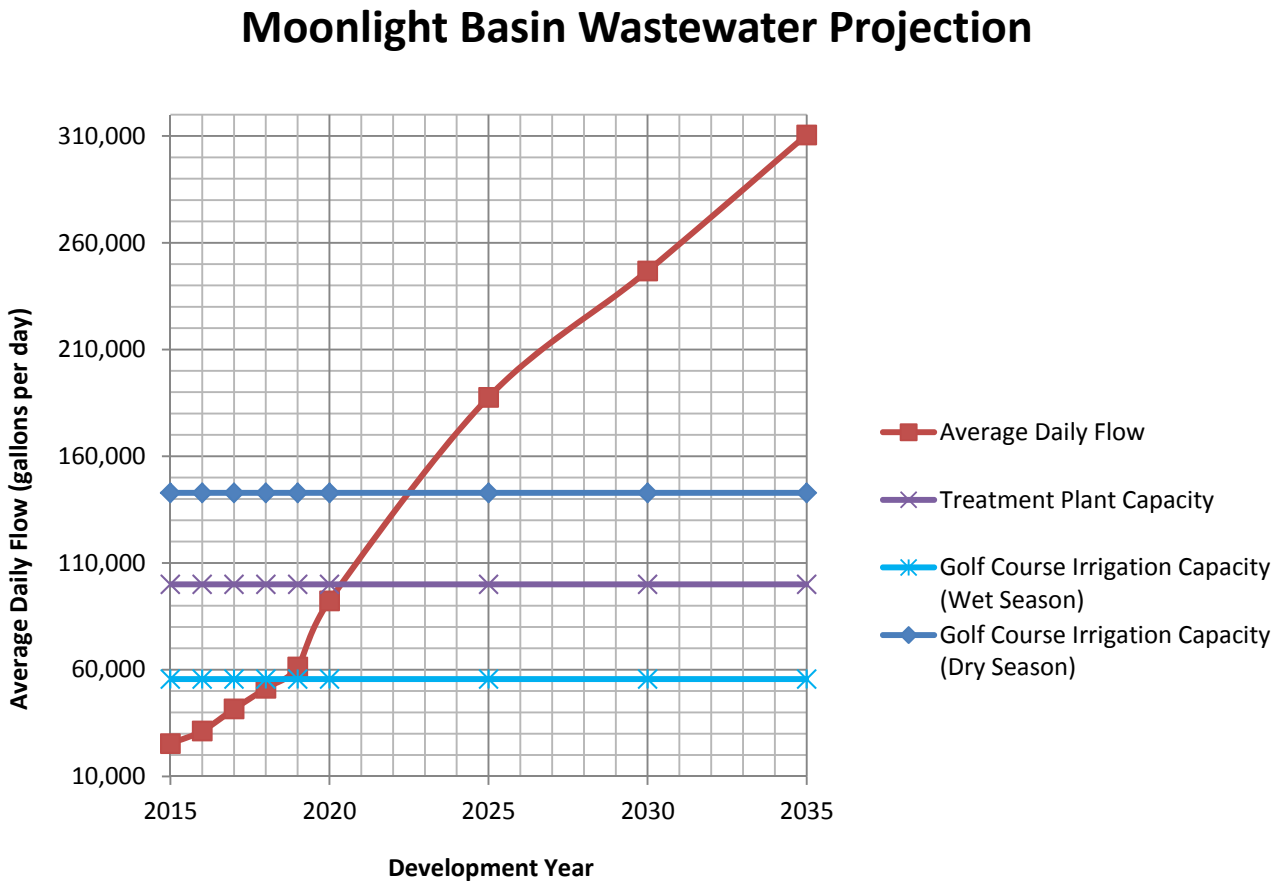
	Volumes from Golf Course Personnel		Design Volumes
	Wet Year (MGY)	Dry Year (MGY)	
Moonlight Basin	20	52	n/a
Spanish Peaks	20	30	76
Yellowstone Club	22	28	101

F. 20-Year Wastewater Projection Model

Using the newly developed, method for computing wastewater generation, WGM Group developed a wastewater generation model for use in projecting anticipated wastewater flows over the life of each development. As we gathered information for each development, it became apparent that some of the development plans are currently be updated or revised. The goal of the wastewater generation model is to have a dynamic model that is easily updated with changes to the development plan, whether they are type of residential or commercial units or the rate that development occurs.

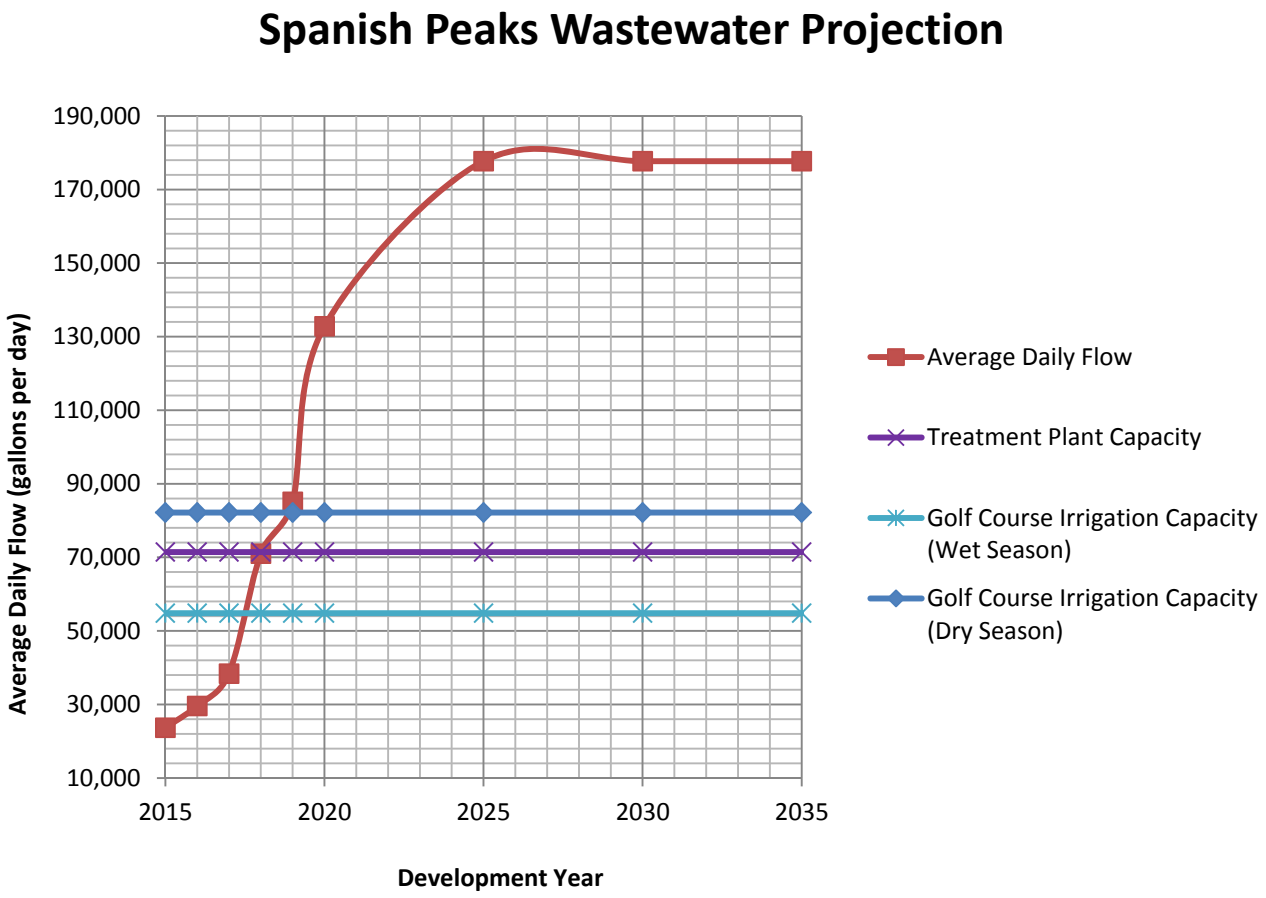
The model provides wastewater generation projections for a 20-year horizon, based on the anticipated occupancy rates established in Section IIIC and the development rates provided for each development. In addition to wastewater generation, the model depicts the current flow and limits of treatment and disposal. Information derived from the model for each development is represented in graphically. The graphical representation of the model data indicates projected wastewater generation over time and when treatment and disposal limits may be reached.

1. **Moonlight Basin Wastewater Model**
   The Moonlight Basin wastewater projection model indicates that the development will be nearing the capacity of the existing treatment plant around 2020 and the Moonlight Basin golf course only has irrigation disposal capacity for roughly half of the overall development.



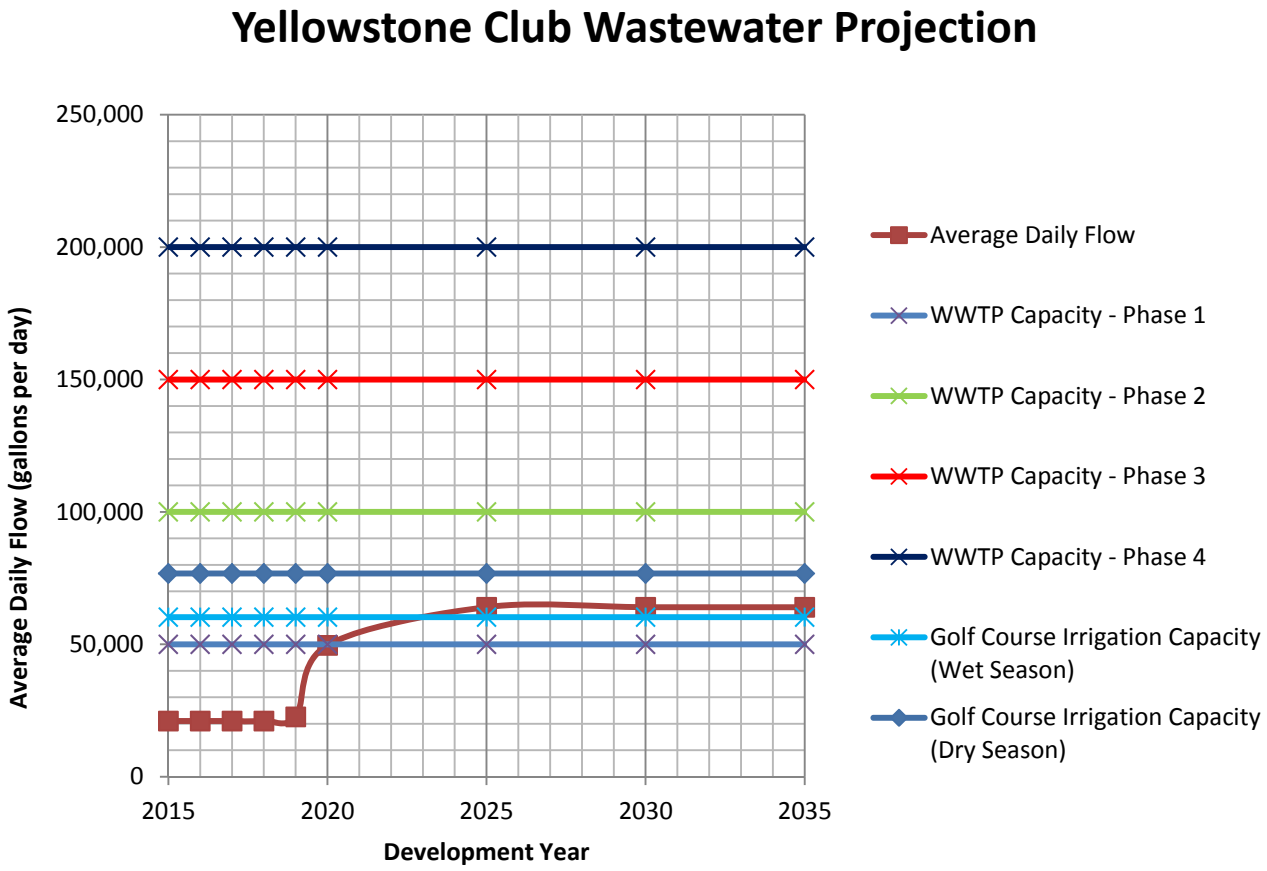
2. Spanish Peaks Wastewater Model

The Spanish Peaks wastewater projection model indicates that the development will reach the current treatment limit with the BSCWSD within the next five years. Additional connections will be needed from the BSCWSD to provide further treatment. Although Spanish Peaks is connected to the BSCWSD and effluent disposal on the golf course will be through the District, the model indicates that in the very near future, the golf course will not have enough capacity to dispose of all treated effluent generated within the portion of the development that is connected to the BSCWSD.



3. Yellowstone Club Wastewater Model

The Yellowstone Club wastewater projection model indicates that the next phase of development may reach the treatment capacity of the existing treatment plant. In dry years, the Yellowstone Club golf course has capacity to dispose of all treated effluent, but would fall short in wet years.

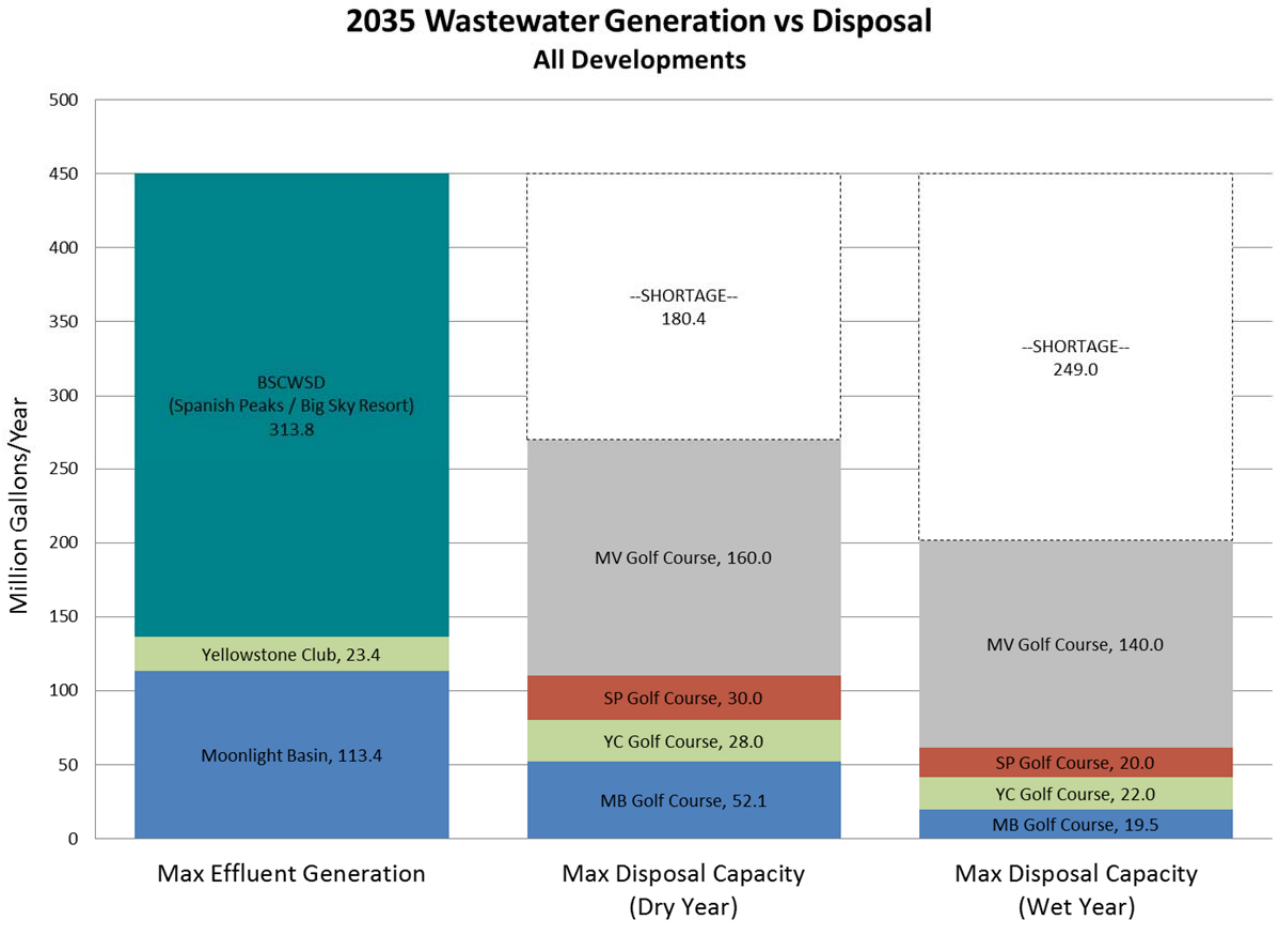


G. Wastewater Generation and Available Disposal

Early discussions with MB MT Acquisition LLC touched on the idea of combining some or all of the wastewater systems between the four developments. Using the updated wastewater projections for 2035 (full build-out) and the anticipated volume of treated effluent that could be applied to the four golf courses, several scenarios were developed to offer a glimpse at how the developments work in isolation and in combination.

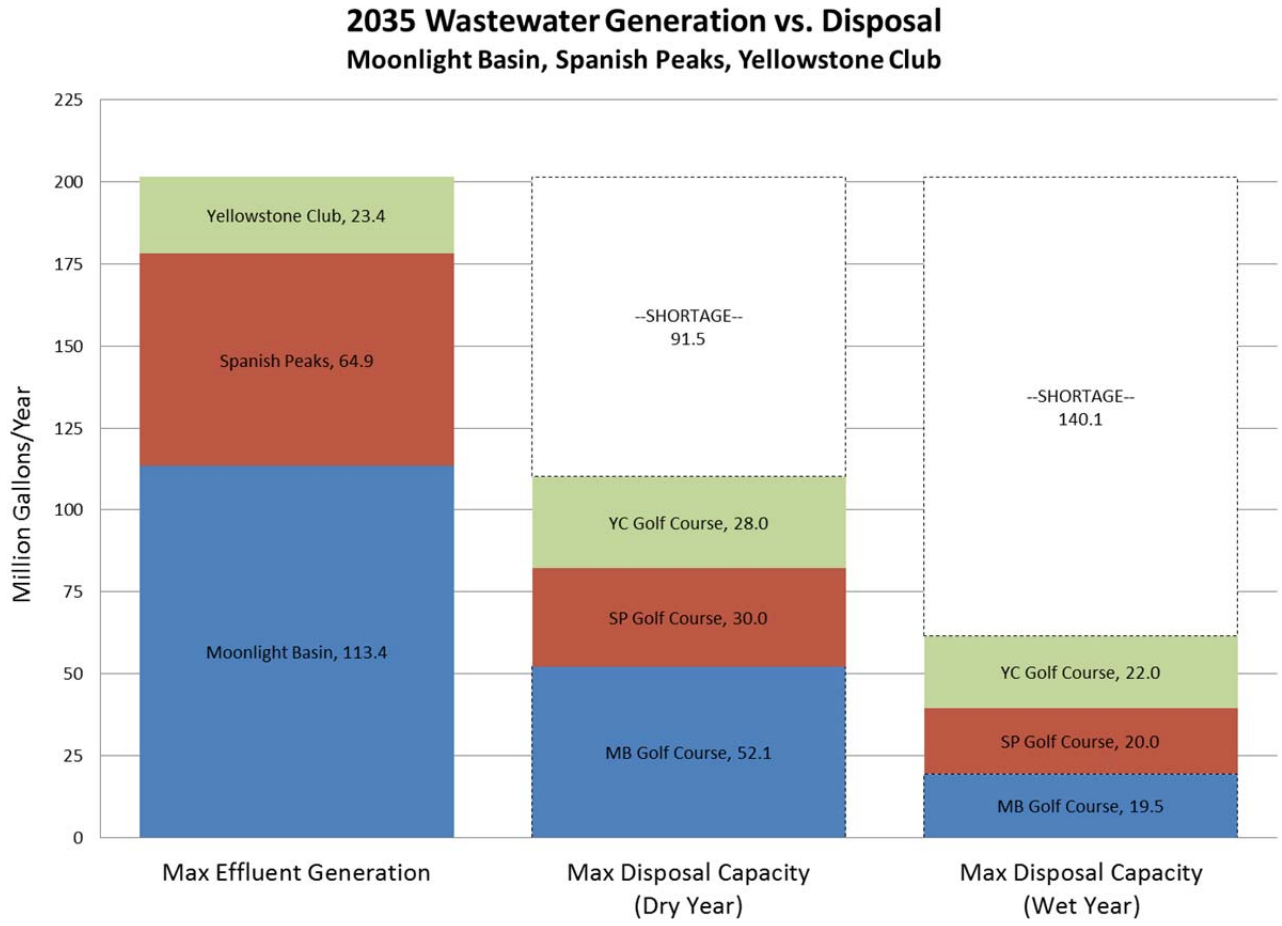
1. Scenario #1

The following chart depicts information for all four developments at full build-out in 2035, with Spanish Peaks and Big Sky Resort effluent generation represented by Big Sky County Water and Sewer District estimates. All four golf courses are depicted for disposal. This scenario demonstrates that regardless of wet or dry years, there is not enough capacity for effluent disposal for all of the developments.



2. Scenario #2

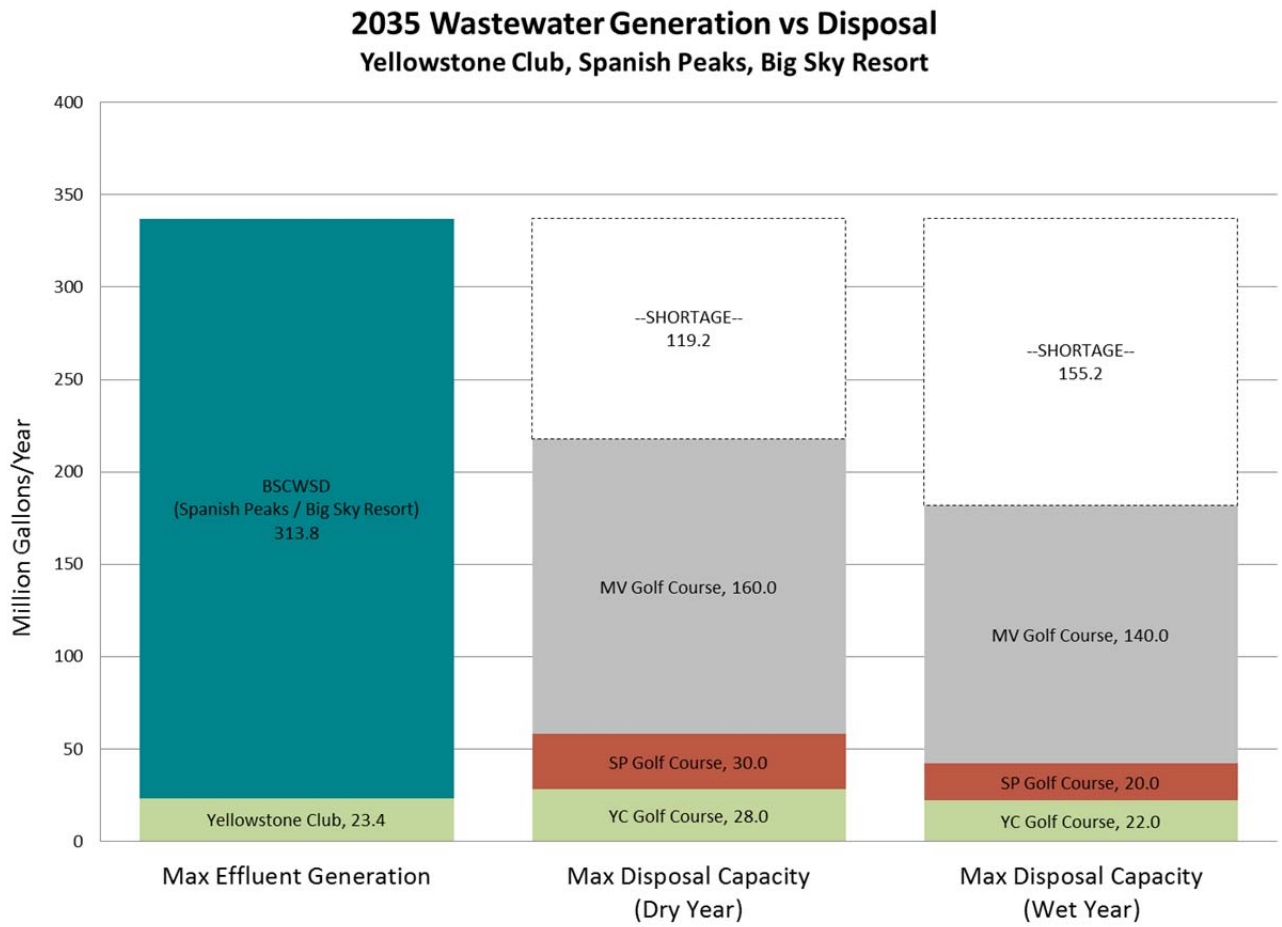
The following chart removes Big Sky Resort information from the previous scenario. It includes information for Spanish Peaks that was estimated through the use of the wastewater model. This scenario is intended to simulate the removal of Spanish Peaks from the Big Sky County Water and Sewer District (BSCWSD), so that Yellowstone Club, Moonlight Basin, and Spanish Peaks would provide their own wastewater collection and disposal. Estimates indicate that without the irrigation capacity of the Meadow Village Golf Course, there is not enough disposal capacity by 2035 for these three developments, regardless of wet or dry years.



3. Scenario #3

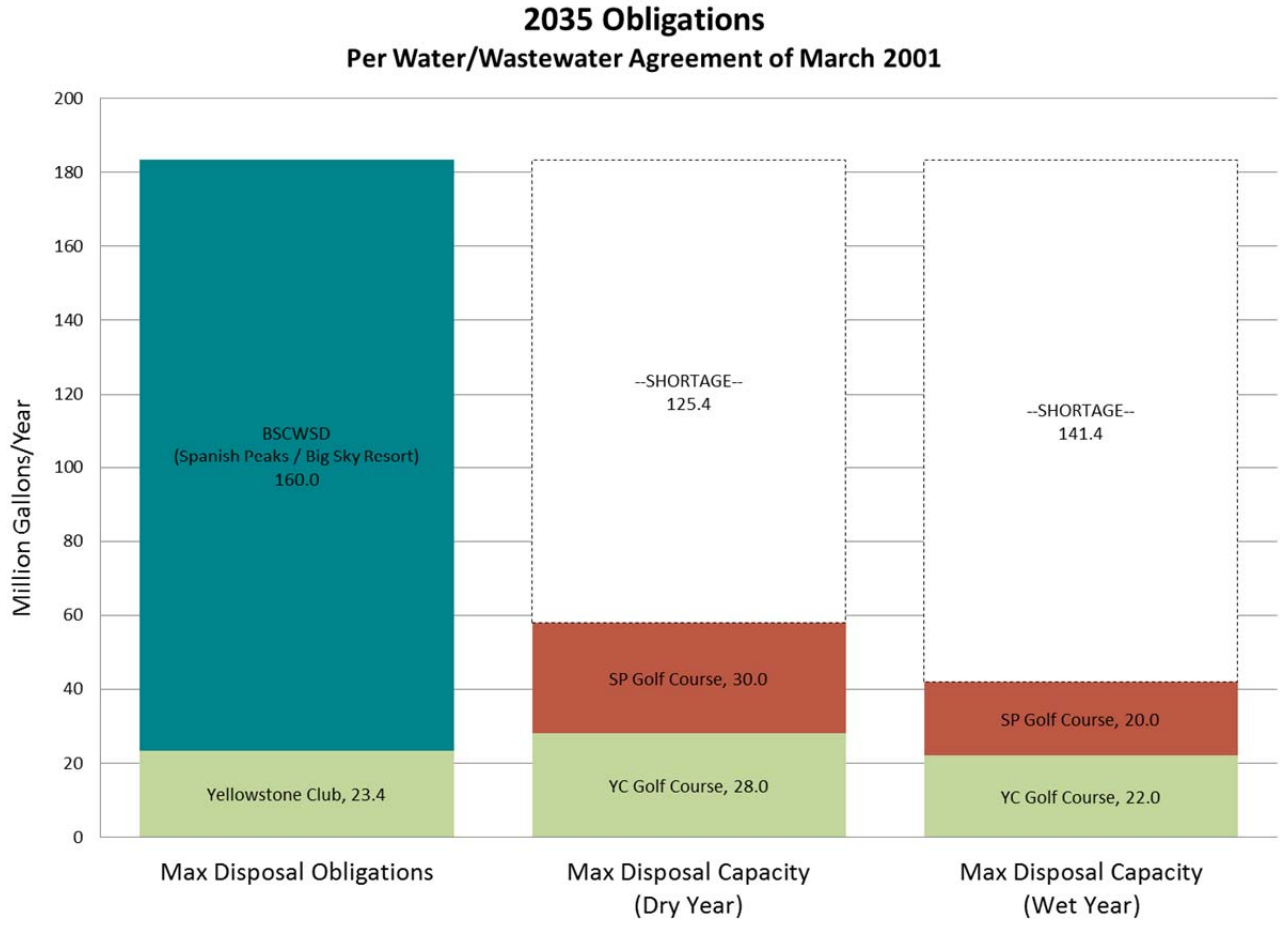
The following chart removes Moonlight Basin from the equation. Assuming Moonlight Basin's wastewater system cannot be reasonably connected with the others, this scenario represents the current operating conditions for wastewater effluent disposal where the Yellowstone Club treatment plant provides effluent for the Yellowstone Club golf course and the BSCWSD has the ability to dispose of their effluent on the Yellowstone Club and Spanish Peaks golf courses. As was the case with previous scenarios, this situation demonstrates insufficient disposal capacity at full build-out regardless of wet or dry years.

It should be noted that the disposal capacity for the Meadow Village golf course was taken from the 2015 DOWL BSCWSD Master Plan Update. DOWL noted that irrigation of the Meadow Village golf course is increasing nitrate and chloride levels in the West Fork. This may limit the volume of wastewater effluent that can be applied to the Meadow Village golf course and would change the total disposal volume capacity shown on the chart below.



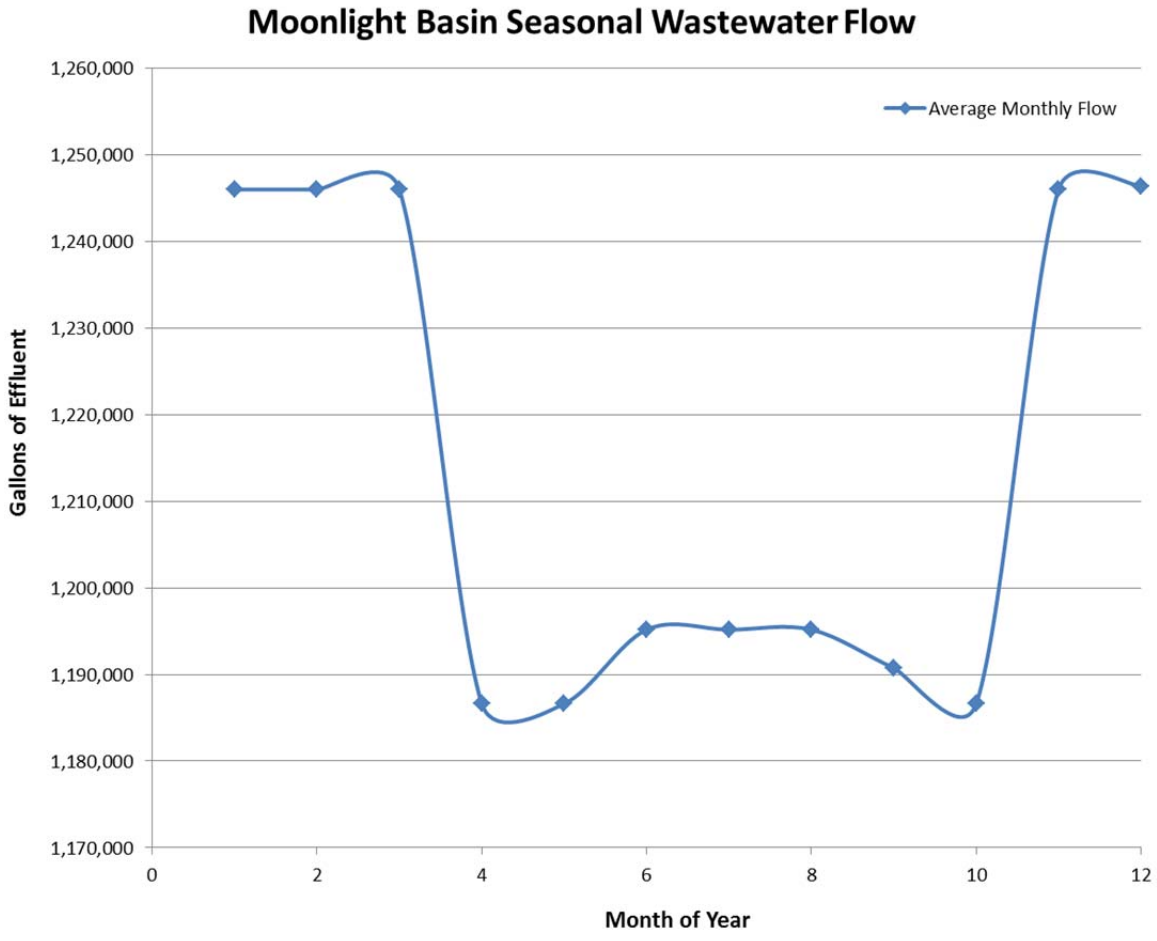
4. Wastewater Agreement with BSCWSD

The following chart depicts the wastewater effluent disposal obligation of Yellowstone Club and Spanish Peaks per the March 29, 2001 agreement between the area developers and the BSCWSD. This agreement states that the District can dispose of up to 160 MGY of treated effluent on the development property. Assuming this volume would all be applied to Yellowstone Club and Spanish Peaks golf courses, golf course irrigation demand falls well short of the required amount.



H. Seasonal Wastewater

Due to the seasonal fluctuation of area population, wastewater generation varies widely from month by month. With the new model providing an anticipated occupancy rate for each month, wastewater general can be estimated at various times of the year. This will be import as water balance models are prepared that evaluate wastewater generation with disposal and determine necessary storage volumes. The graph below demonstrates season fluctuations in wastewater generation for current conditions at Moonlight Basin. Spanish Peaks and Yellowstone Club have a similar annual pattern.



I. Conclusions and Highlights

This section highlights important information and offers concluding thoughts from the wastewater analysis.

1. Updated Wastewater Model

- Wastewater generation in the updated model is based on 86 gallons per capita, as established in the 2015 BSCWSD Master Plan Update. This value assumes an inflow and infiltration rate of 11.9 gpcpd, which was determined based on historic I/I rates in the BSCWSD during non-spring runoff months. This is assumed to be a value that would apply to Moonlight Basin and Yellowstone Club, as they have similar wastewater collection systems. If there is a known high rate of I/I in either of these systems, this number should be adjusted to account for those specific conditions.
- Seasonal wastewater flow is accounted for in the updated wastewater model and can be applied to future water balance to evaluate generation, disposal, and storage requirements.
- The wastewater model can be updated at any time to stay current with the development and occupancy rates of Moonlight Basin, Spanish Peaks, and Yellowstone Club.

2. BSCWSD Master Plan Update Report

- The BSCWSD is legally obligated to provide water and wastewater services for 7,926.3 SFEs, through its subdivision review process. As of August 2014, the District has issued permits for 4,686 SFEs, leaving 3,240.3 SFEs for future connection. In addition, the District has an obligation to provide wastewater service to Lone Moose Meadows and Spanish Peaks through the March 29, 2001 development agreement. This agreement specifies the connections from these developments shall not exceed 1,900 SFEs or an equivalent flow of 80.86 MGY. At the current flow of 26,500 GPY per SFE, the 1,900 SFEs equate to 50.3 MGY. The BSCWSD Master Plan Update includes approximately 850 additional connections for Lone Moose Meadows and Spanish Peaks to reach to total wastewater flow of 80.86 MGY.
- The BSCWSD Master Plan Updated report prepared by DOWL assumed the occupancy rate within the District will increase by 15% during the ski season and 20% during the remainder of the year. These values are much lower than the overall occupancy rate increases that were established for Moonlight Basin, Spanish Peaks, and Yellowstone Club, which in some cases indicate occupancy rate increases of over 100%.

3. Moonlight Basin

- The Moonlight Basin wastewater projection model indicates that the development will be nearing capacity of the existing treatment plant around the year 2020.

- The Moonlight Basin golf course only has irrigation disposal capacity for roughly half of the overall development.

4. Spanish Peaks

- The Spanish Peaks wastewater projection model indicates that the development will reach the current treatment limit with the BSCWSD in the next five years. Additional connections will be needed from the BSCWSD to provide treatment beyond that date.
- Although Spanish Peaks is connected to the BSCWSD and effluent disposal on the golf course will be through the District, the model indicates that in the very near future, the golf course will not have enough capacity to dispose of all treated effluent generated within the portion of the development that is connected to the BSCWSD.

5. Yellowstone Club

- The Yellowstone Club wastewater projection model indicates that the next phase of development may reach the treatment capacity of the existing treatment plant.
- The Yellowstone golf course has capacity in dry years to dispose of all the treated effluent that is anticipated to be generated within the development. However, in wet years, there is a shortfall of 1.4 MGY.

6. Wastewater Effluent Storage and Disposal

- The actual disposal capacity through irrigation to the existing golf courses is substantial less than what has been previously estimate and/or approved. This is due to variations in the soil percolation rates, nitrogen uptake and irrigation period.
- The BSCWSD Master Plan update report includes a brief discussion of alternatives for wastewater disposal. These include subsurface disposal and disposal in the Jack Creek drainage by land application. This is similar to alternatives discussed with Moonlight Basin for disposing of effluent from that development.
- The BSCWSD Master Plan Update identifies the Yellowstone Club and Spanish Peaks golf courses as areas to dispose of 160 MG of treated effluent per year. According to golf course personnel, this is substantially higher than the volume of irrigation that can be actually applied.
- Disposal in the Jack Creek basin has been considered by both the BSCWSD and Moonlight Basin.

IV. RECLAMATION AND REUSE

Circular DEQ-2 was updated in October 2012 to include new standards for water reclamation and reuse. This document specifies standards for wastewater disposal through rapid infiltration to groundwater and snow making – disposal options to help address future wastewater for the resort developments.

A. Reclaimed Wastewater for Irrigation

The new standards in Circular DEQ-2, Chapter 120 relate to the controlled application of treated effluent to harvestable crops. The standards apply to complete crop uptake of nutrients with no impact to groundwater and surface water. To gain DEQ approval, an applicant must provide a change of appropriation or water right approved by the Department of Natural Resources and Conservation (DNRC), or submit a statement from DNRC that no approval is needed.

Four classes of reclaimed wastewater are identified, each applying to different irrigation uses. The classes differ by the degree of additional treatment provided following secondary treatment. Treated wastewater to be used for golf course irrigation with unrestricted access must be treated to meet Class A requirements, which are shown in Table 13.

Table 13: DEQ Class A
Reclaimed Wastewater Treatment Standards

BOD_5	< 10 mg/L
TSS	< 10 mg/L
Coliform	< 2.2/ml (median 7-day) 23/100 ml (max)
Buffer Zone	None

B. Rapid Infiltration Systems

Also included in Circular DEQ-2, Chapter 120 are standards for the use of rapid infiltration (RI) systems, which are utilized for the disposal of treated effluent to groundwater through either infiltration/percolation (I/P) basins or subsurface absorption cells. RI systems require a groundwater discharge permit from DEQ, unless an exemption applies. If the groundwater beneath the RI is hydrologically connected to surface water, the discharge will be considered the same as a surface water discharge and a Montana Pollutant Discharge Elimination System permit will be required.

Treated wastewater effluent for subsurface absorption cells must meet the standards shown in Table 14.

Table 14: DEQ Treatment Standards for Subsurface Absorption Cells

BOD_5	< 10 mg/L
TSS	< 10 mg/L
Turbidity	< 5NTU
Total N	< 5 mg/L

RI systems must not be within the 100-year floodplain and must be a minimum of 500 feet from water supply wells. Soil investigation must be conducted for the proposed site at the actual depth in the soil profile intended for the RI system. Test pits and borings are required on all sites and infiltration and permeability tests must be conducted in-situ at the proposed site. A phosphorus break-through analysis must be performed for each major soil type within the site, including a phosphorous absorption test.

Hydraulic loading rates for RI system are based on the field and laboratory test results for infiltration, permeability, hydraulic conductivity, and transmissivity for the intended site.

C. Water Reclamation and Reuse Standards

Circular DEQ-2, Appendix B addresses standards for allowable uses of reclaimed wastewater that are not included in Chapter 120. These uses include:

- Spray Irrigation of Nonfood Crops
- Drip or Subsurface Irrigation of Nonfood Crops
- Spray Irrigation of Food Crops
- Drip or Subsurface Irrigation of Food Crops
- Landscape Irrigation
- Impoundments
- Animal and Fish Operations
- Decorative Fountains
- Jetting and Flushing of Sanitary Sewers
- Street Cleaning and Washing Operations
- Dust Control and Soil Compaction/Consolidation
- Fire Fighting and Fire Protection Systems
- Toilet and Urinal Flushing
- Washing Aggregate and Concrete Batching Operations
- Industrial Uses
- Aquifer Recharge
- Aquifer Injection
- Indirect Potable Reuse

- Stream Flow Augmentation
- Snow Making

For Moonlight Basin, Spanish Peaks, and Yellowstone Club, reuse/reclamation alternatives must allow for the disposal of large quantities of wastewater. The most promising options include golf course irrigation, snow making, and aquifer recharge. The use any of these options, wastewater must meet Class A-1 requirements prior to application.

D. Findings

Reclamation and reuse will key components in addressing the future wastewater disposal shortage for the developments. Providing a viable way of effluent disposal during the winter months will solve the two major issues related to disposal: 1) the existing golf courses do not have the capacity to disposal of all of the future wastewater through irrigation; 2) future storage volumes would be unmanageable. The most likely methods of winter effluent disposal are snow making and rapid infiltration. Both methods are DEQ-permitted reclamation uses.

Two potential areas for rapid infiltration are shown on the Wastewater Disposal Plan included in Appendix E. One area is within the Gallatin Drainage, which was previously identified as part of the PER for the Canyon Area. Initial estimates indicate disposal capacity in this area may be 75 MGY. While this volume addresses the entire projected shortage for the developments, it may be considered in conjunction with other methods of disposal.

The second area for rapid infiltration is in the Madison Valley, along Jack Creek. The Natural Resources Conservation Service (NRCS) identifies most of the soils in this area of the Madison Valley as “very limited” for rapid infiltration due to slow water movement through the soil. However, there is an area identified as Kalsted sandy loam with 2 to 8 percent slope that is listed as “somewhat limited,” which may provide for rapid infiltration disposal. If this area is viable, a water rights investigation will be needed to determine if groundwater from the Gallatin drainage can be disposed in the Madison drainage.

Snow making continues to be a likely method of large-volume disposal. With the existing treated wastewater storage at Yellowstone Club and the likelihood of treated storage at Spanish Peaks, these two areas would be ideal for a pilot snow making program to test the quality of the snow, as well as spring snow melt.